

**WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE**

**CENTRAL ALASKA NETWORK**

**Vegetation Monitoring Program**

**Summary Trip Report: Carden Hills Mini-grid**

**29 July – 7 Aug, 2009**



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## **PURPOSE:**

The purpose of this trip was to complete the process of establishing and measuring permanent vegetation sampling plots at the Carden Hills mini-grid according to the Central Alaska Network (CAKN) vegetation monitoring protocols (see Roland *et al.* 2005). The 2008 botany crew sampled 16 points and this year we sampled the remaining 9. We also re-sampled 6 points to compare two sample iterations for the same plot separated by one year. It should be noted that we sampled this mini-grid about a month later this year than in 2008, so differences in species composition or vegetation structure may be influenced by differences in the phenological state of the vegetation between the sample iterations.

## **PERSONNEL:**

Fleur Nicklen - crew leader, vascular composition, plot/quadrat variable estimates, transects

Dave Kofranek - non-vascular collections/id, soils data

Brandon Gottung – plot photos, tree and sapling data, tree cores, transect data

## **ACCESS TO MINI-GRID AND CAMPING POSSIBILITIES:**

The Carden Hills mini-grid is accessible via float plane. We drove to 40-mile Air based in Tok (2.5 to 3 hours from Gulkana). From Tok the pilot drove us to Midway Lake (30 towards Canada). It took 2 flights in a Cessna 185 to get us and our gear to Carden Lake. The flight was about 45 minutes one way, so the shuttling process took just over 3 hours. Carden Lake is about 2 km wide, but it is extremely shallow. The pilot estimated the whole lake was only about 1 meter deep. Despite its shallowness, it is not a problem to land in because there are no rocks.

We found a better camping and cook tent spot than we had last year. We were about 150 meters closer to the mini-grid this year than we were last year and about 180 meters south of point 5. This area required no marshy lake walking in the morning and less bog crossing than the 2008 camp spot. We were still camped outside of the mini-grid and would only be able to complete 2 points per day. Like last year, we put our tents up in the forest between moss hummocks and had our cook tent in the tall *Calamagrostis* next to the lake and adjacent to an outlet of the bog where we could gather water. The lake is too marshy and mucky to get water from; you sink to your thighs in organic matter before you have even passed the sedges on the lake border.

## **HIKING:**

Hiking is very difficult at Carden Hills. There is near 500 m of elevation change within the mini-grid. Because we often had to hike up and down a hill to get to a point and up and down to get back to camp, there was more climbing than the topography suggests. The real difficulty is the thick, relentless vegetation on these slopes. The best access points in the mini-grid are ridges: the west ridge starting between points 9 and 10 offer the best walking through open spruce-birch forest. The ridge that angles SE to NW to the center of the mini-grid (here on, center ridge) is also OK walking, but can be disorienting because of its direction and many varying slopes (Map 1). The area from the 11-15 row to north of the 16-20 row has extremely thick alder, dwarf birch, and birch hybrids. It is hard, slow walking. The northernmost row of

points has open tundra and easy walking except for a little bit of side-hilling in some rock fields, but getting to this back row takes about 3 hours. South of point 21 gets quite difficult as you battle your way across thick *Betula occidentalis* covering large boulders with leg or body size holes that will trap you as you fall down through the birch.

### **WEATHER AND ENVIRONMENTAL CONDITIONS:**

We generally had hot and smoky weather. On our last day of field work the soil thermometer read 99.1 degrees in the shade. There were only 3 days with some rain. The evenings were quite chilly; we had frost on several of the mornings (giving us temperature fluctuations of 50+ degrees nearly every day!). On our pickup day, the visibility due to smoke was less than ¼ mile in Tok and we were delayed a day getting back to Copper Center.

### **SAFETY CONSIDERATIONS:**

The steep rocky slopes around points 16 to 20 are potentially hazardous, particularly the *B. occidentalis* covered boulders south of point 21 (described under 'hiking'). It is a substantial hike up to points 20 through 25 and on the way back you need to be extra careful on the loose rocks and small drop-offs because you will be tired. In addition, walking through the bogs invites twisted ankles and moments of potentially unsafe rage following muddy face-plants between tussocks (mostly experienced in 2008). The extreme temperature fluctuations we had made it extra important to stay hydrated and to have appropriate layers of clothing.

Radio contact to Slana or Gulkana is not possible from Carden Hills. Satellite phone is the only means of contact.

### **PHENOLOGY OBSERVATIONS:**

The phenology was past peak flowering, but not too late to make good species determinations. *Potentilla fruticosa*, *Papaver* sp., and several other species were in late flower. *Vaccinium vitis-idaea* and *Oxycoccus microcarpus* were in early fruit. *Vaccinium uliginosum*, *Geocaulon lividum*, *Valeriana capitata*, *Empetrum nigrum*, *Rubus chamaemorus*, *Ribes triste*, and *Goodyera repens* were all fruiting. We also found lots of boletes out at this time (king, birch and aspen boletes).

### **GENERAL NOTES ON PLOT-WORK AND PLOT OBSERVATIONS:**

I collected 42 vascular plant specimens from the Carden Hills mini-grid and Dave collected 90 nonvascular plants (Table 1). On average there were 28 vascular and 13 nonvascular plants per plot. Although each plot, save the 4 alpine plots, had relatively low diversity, the entire mini-grid contained quite variable vegetation types: tussock bog, stunted black spruce-sphagnum areas, tall white spruce-birch forest, alder stands, dwarf birch scrub, and dwarf shrub tundra. The number of the first photo taken at Carden Hills is 100-0984 and the last is 100-1259 with several deletions between these numbers. Dave collected soil from all 15 sampled points. Only at points 4 and 23 did he not collect at all four locations due to a thick organic mat and rocks. Brandon measured trees and saplings in all of the plots sampled, but only cored trees in the plots that had

not been sampled before and had trees to core (2 cores at plot 6, and 4 cores at plots 11, 16, 17, 18). Most of the spruce trees had spruce needle rust.

Wildlife: The majority of wildlife was seen around the lake at camp. We saw several moose near the lake as well as a beaver. There was a pair of swans, some unidentifiable waterfowl, and 1 mull gull (same lonely one as last year?).

**Table 1. Collection series for the Upper Caribou mini-grid.**

Collector	Identifier	Series
Nicklen	Vascular plants	EFN-09-249 to EFN-09-290
Gottung	Photos	100-0984 to 100-1259
Kofranek	Nonvascular collections	4849 to 4938

## **ACTIVITIES:**

### **Wednesday, July 29**

We had all of our gear packed into the work truck by 6:45am and were on the road by 7:00 and arrived in Tok at 9:40am. Nick, the fisheries SCA, drove us in the LE vehicle. Once at 40-Mile-Air we checked to see if we would be able to come out one day early, since we assumed we would complete 9 new plots and repeat 6 plots in 7 days of sampling. We could continue to redo plots that we had sampled last year. 40-Mile-Air was able to schedule us for a pick up on August 6<sup>th</sup> instead of the 7<sup>th</sup> with no problem.

Once all of us and our gear were weighed we loaded our stuff into 40-Mile-Air's truck and the pilot took us to Midway Lake. Brandon and I flew first. While waiting for Dave, we set up the cook tent and found a shady spot for our bear barrels and then set our tents up in the forest as close as we could get to point 5 without being in the bog. This tent area choice made our morning and evening commutes more pleasant than the previous year. We finished setting up camp by 4:30 and decided it was too late to attempt one of the new plots and too early in the sampling trip to redo a plot from last year.

Weather: Smoky and very hot. We were all dripping with sweat loading the plane and flying. If it were possible to jump in Carden Lake without sinking to your waist in muck and getting several hundred leeches, we would have done it.

### **Thursday, July 30**

On Thursday we sampled points 23 and 22. We left camp just before 8am and headed up the west ridge to a N-S running saddle that takes you to the south side of the main E-W running Carden Hills ridge. We stopped briefly here to call in for the morning (Gulkana dispatch likes us to call in between 8:30 and 9am). This area is steep and has open grown spruce and very thick dwarf birch. We angled up this slope towards the saddle in the Carden Hills ridge. Once to the saddle we dropped down the north side of the ridge about 400 ft and made it to plot 23 by 10:15. Plot 23 is about 75% dwarf scrub and 25% closed low scrub with some saplings. We finished the plot by 1:30pm, ate lunch, and headed east and a couple hundred feet uphill to point 22, which is a more alpine plot surrounded by old rock slides. We found the highest diversity within

the mini-grid at point 22 (47 vascular plants and 27 nonvascular). We finished sampling at 6:20 pm and decided to head back. We took the center ridge home and were back to camp by 8:30. Weather: Smokey, but otherwise clear and in the 70s up on the ridge (much warmer near the lake).

### Friday, July 31

On Friday we sampled plots 11 and 6. At 8am we headed up the center ridge and maintained our elevation following this ridge NW around the east drainage. Once around the drainage we walked for the one the slowest and most tedious 1 km of my life through a spruce-birch-alder mix. This was difficult with the quadrat frame in my pack. Point 11 is in an area just like we walked through and has low diversity (17 vascular plants and 6 nonvascular; Fig 1).



Figure 1. Plot 11 of Carden Hills mini-grid.

After lunch we hiked south and downhill (easier than side-hilling through alder) to point 6. Point 6 is located in the east drainage in a stunted spruce bog. We had a long hike up the east drainage to the center ridge, which we crossed and side-hilled down as it curves west towards our tents near point 5. There were good *Rubus chamaemorus* berries in the east drainage. We were home by 8pm.

Weather: It was sunny in the morning and began to cloud over by early afternoon and it was raining by the end of our second plot and for walk back to camp.

## Saturday, August 1

On Saturday, we completed points 21 and 16. It was wet in the morning from the evening rain, but it was also windy and the vegetation dried quickly. Because the hiking is so difficult throughout most of the mini-grid, we chose to walk up the west ridge to the saddle connecting us to the main Carden Hills ridge. After fighting our way through alder and dwarf birch we made it to the Carden Hills saddle and took the clear north side of this ridge to plot 21. Point 21 is a fairly diverse plot with a mix of low scrub and tundra and a few scattered boulders (Fig. 2)



Figure 2. Plot 21 of the Carden Hills mini-grid.

After lunch we headed towards point 16. South of 21 is a very treacherous boulder field covered with thick *Betula occidentalis*. At one point I stepped on what I thought was moss or leaves and plummeted between boulders. Brandon employed a diving and swimming method through the brush. Point 16 contains two large, open-grown white spruce (with spruce needle rust) and some smaller birch as well as *Alnus viridus*, *B. occidentalis* and a virtual monoculture of *Ledum groenlandicum*. We finished this plot at 7:30pm. Heading back to camp, the Garmin was low on batteries and not working in the thick alder anyway, so I turned it off. I was tired and it was dark with clouds and there was poor visibility in the thick brush. I was aiming to hit the center ridge and take this down to camp. In my tired state, I thought I had overshot the ridge and started heading down, thinking I was going towards the lake. In reality, I had undershot the ridge and was headed into the east drainage. It was terrible when I realized my mistake and we had to climb up and over the center ridge to get back home! It is crucial to pay attention to where you are before making route-finding decisions in this area. We were back to camp by 9:45pm

Weather: Smoky, but warm and otherwise clear in the morning. Clouds, drizzle and smoke in the evening.

## Sunday, August 2

Sunday we sampled points 14 and 15. These were points that had been sampled 1 year prior. We did not core trees at these points, but we did everything else including collect soil samples. Both of these points are in drainages, have down trees, thick brush and are difficult to move around (Fig. 3). We left camp at 8am and were back by 6:30pm.



Figure 3. Plot 14 of the Carden Hills mini-grid.

Weather: Warm (60s to low 70s) and sunny with some smoke.

## Monday, August 3

This day we sampled points 17 and 18. At 8am we headed up the ridge leading from camp to the center ridge to the alder-spruce-birch hill of hell. The walking on this hill slope was just as hard as it was on the day we went to point 11. Point 17 is in a tall spruce area with tall alder and willow and small patch of dry *Festuca altaica* habitat. It is very difficult to move around this plot. I found what I thought was an unusual sedge here (editor's note: it was *C. media*). After lunch we headed west to point 18, which was dominated by thick *Betula occidentalis* and *B. nana*. This evening I successfully hit the center ridge on the way home and contoured down this hillside perfectly to our camp. We were home by 8pm.

Weather: We had frost in the morning and temperatures during the day in the upper 70s. Smoky.

## Tuesday, August 4

On Tuesday we sampled points 1 and 4. Point 1 was our last new point to complete this year and point 4 was a redo from last year. At 8am we began our hike up and over the center ridge. Once over the center ridge we were very thrifty with our elevation and carefully contoured around a drainage and down to point 1. Point 1 is an open, stunted black spruce forest (Fig. 4).



Figure 4. Point 1 of the Carden Hills mini-grid looking north into the 'east drainage'.

It was very hot as we climbed from point 1 up and over the 'center ridge' to point 4. Point 4 is also a black spruce woodland, but has taller trees and more lichens in the ground cover. The lichen was much drier this year than last and crumbled easily as we walked around the plot. I found *Pinguicula villosa* at both points. These were two of our fastest plots to sample because they were relatively open and not very diverse.

Weather: Frost in the morning. Smoky, but otherwise clear with temperatures in the mid 80s.

### Wednesday, August 5

On this day, we re-sampled 3 points: 10, 9, and 5. Plot 10 is located on the 'west ridge' and is a tall spruce-birch plot with an open understory of almost only *Hylocomium splendens* and 13 vascular species. This was easy to get to (1/2 hour) and quick to sample.



Figure 5. Point 10 of the Carden Hills mini-grid.

Next we headed to plot 9, which is thick with black spruce, alder and willow. It has running water through the center of the plot (Fig 6). Finally, we headed to plot 05, which is located on a little prominence surrounded by wetland bog. I found a *Ranunculus* species in this plot that I did not see last year.



Figure 6. Plot 9 of Carden Hills mini-grid. Note the running water in plot. This water level seems comparable to what we saw in 2008 (wet year).

Weather: Smoky, sunny and hot. Temperatures were in the high 80s to 90s. At point 5 Dave recorded an air temperature of 99.1 (Fig. 7)



Figure 7. Air temperature at Carden Hills 05 on August 05 2009.

## Thursday, August 6

At this point in our sampling trip we had completed the 9 un-sampled points and re-sampled 6 points that had been sampled just last year. We decided to schedule our pick-up day one day early. On Thursday, we had all of our tents and personal gear packed by the time we called in for the morning. We were informed that it was both extremely smoky and foggy in Gulkana. It was fairly overcast at Carden Lake, but easily navigable by air. I called 40-Mile-Air to see how Tok was looking. They had thick smoke and less than  $\frac{1}{4}$  mile visibility. We called every 2-3 hours to check on their status. We entered some data on the tablet. By around 7pm we had given up hope of being picked up. We had a thunderstorm and it was pouring rain and getting chilly. We set our tents up and they were filled with huge puddles. At around 8:30pm, when we were soaked and cold and ready to eat the dinner Dave prepared, we heard a motor and our pilot came zooming over Carden Hills and through a hole in the clouds. We all cheered. Brandon left first. The pilot wasn't sure he would make it back for Dave and me, but happily around 9:30 he came back and we had a view of the red, smoky sun setting for the flight to Midway Lake. We barely made it back before it was too dark to fly (Fig. 8). We were all back to 40-Mile-Air by 11pm.



Figure 8. 40-Mile-Air pilot pulling our plane into the dock at Midway Lake. It was nearly dark and still very smoky.

While we were waiting for the plane to pick us up, our ride back to Copper Center came to Tok to pick us up. Our driver had to be back to Copper Center by 6 and had to leave Tok well before we were even picked up from Carden Hills. Consequently, we had to camp in Tok behind the hanger (Figure 9).

Weather: Sunny and sprinkles off and on through the day. Thunderstorm and heavy rain in the evening. Smoky in Tok.

### **Friday, August 7**

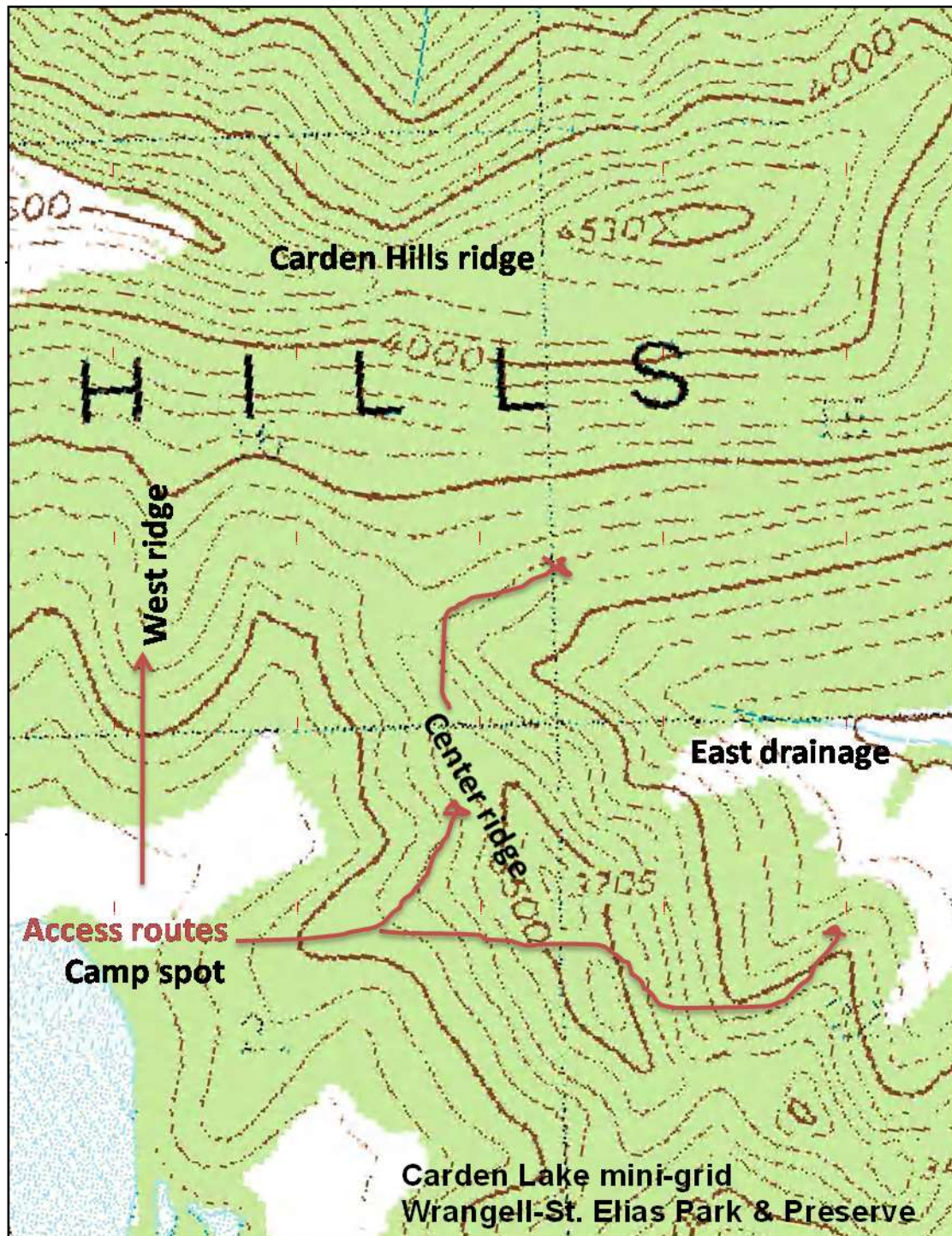
Ryan from maintenance picked us up the next morning at 11 am and drove us back to Copper Center

Weather: Overcast and smoky with patches of fog. Cooler

### **CONCLUSIONS AND FUTURE CONSIDERATIONS:**

The Carden Hills mini-grid was very challenging for our crew. There is a substantial amount of elevation gain, very brushy conditions, and difficult navigation. The camp spot that we had in 2009 was as good as it can get for this mini-grid. We were about 180 meters south of point 5. This spot allowed us to avoid walking through very wet areas around the lake and to avoid the bog when sampling the eastern half of the mini-grid.

Phenologically, this mini-grid is good to sample between the end of June and through mid August. We sampled this mini-grid in a wet year (2008) and a dry year (2009). I observed few minor differences between the two years. Graminoids appeared to be taller, but this is likely due to sampling later in the year. Sphagnum and lichens were drier this year as compared to last.



Map 1. Carden Hills mini-grid with preferable access routes and camp spot noted.

## REFERENCES CITED

Roland, C.A., Oakley, K., Debevec, E. & Loomis, P. (2005) Monitoring vegetation structure and composition at multiple spatial scales in the Central Alaska Network. National Park Service, Central Alaska Network, Final Monitoring Protocol.